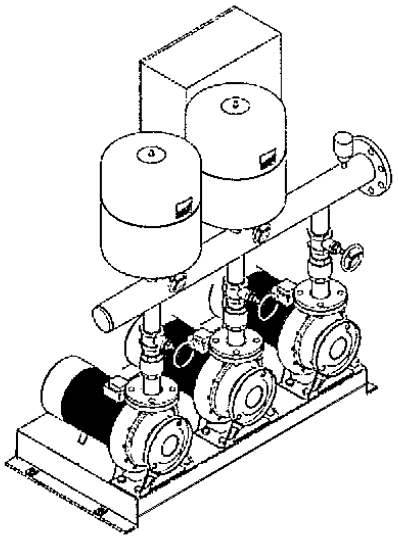
ETL-PIM-UN3-0002A

INSTRUCTION MANUAL

Ebara Pressure Booster Unit

Model ***UN3C- D,T & F (2-4 pumps & 2-4 inverters operation system)***

Contents



1. INTRODUCTION

Thank you for your purchase of this Ebara Pressure Booster Unit Model ***UN3C-D, T & F***.

Ebara has manufactured this unit with due care so that it can be operated with ease. However, if it is improperly operated, unexpected accidents may result.

Therefore, you are requested to operate this unit according to this manual and to keep it for reference.

Upon arrival, please perform the following:

(1) Check the unit is as ordered by referring to name plate.

(2) Check for possible shipping damage and loosened nuts or bolts.

(3) Check for missing accessories.

If defects and / or missing accessories are found, contact your nearest service representative and referencing the items listed on our brochure.

2. GENERAL SAFETY WARNINGS

Safety warnings are described at certain situations to prevent any accident or injury with prior notice. And every safety warnings are divided into "Caution" and "Warning" by the level of danger. These are very important for your safety. Please keep and proceed according to the notice of warnings.

 **Warning**	**Extremely danger for possibility of death or serious injury by mishandling or mistake.**
 **Caution**	**Danger for possibility of slight injury or damage of products by mishandling or mistake.**

Failure to observe these safety warnings and / or any tampering with this unit exempts Ebara Corporation from all responsibility in the event of accidents to persons or damage to things and / or to the unit.

 **Warning**	**Unlicensed person is not allowed to carry out wiring and grounding.**
	Wiring and grounding is done completely according to the laws and the regulations.
	Unauthorized person is not allowed to disassemble, tamper or repair this unit.
	Whenever handling for inspection, priming or repair of this unit, always disconnect the electric power first.
	Whenever this unit is suspended for a long period, disconnect the electric power.
 **Caution**	**Care must be taken not to exceed the range of the specification during use of this unit.**
	Insulation and / or dielectric test for terminal of sensors in the control panel are not allowed.
	Pump is not run without full of water.
	Motor, control panel and sensors is not splashed with water.
	Do not touch the rotating parts.
	Motor and control panel is not covered by cloth or blanket.
	More than 10 minutes running with valve shutoff is not allowed.
	Whenever problems happen on this unit, disconnect electricity soon and contact your nearest representatives.

3. SPECIFICATION

Standard specification is shown as follows. Optional specification and / or details are referred to other approved documents.

Handling liquid	: Clean water 0 ~ 60°C
Installation	: Outdoor design
Phase, Hz, Voltage	: Three phases, 50Hz, AC 380V +10/- 6 %
Allowable suction head	: -0.3 ~ + 0.3 bar G
Pump model	: CDX, 2CDX, 3M or EVM (Vertical Multi-stage)
Control system	: Water supply pressure control by variable speed drive
Operation system	: UN3C-D ; 2 pumps & 2 Inverters operation control
	UN3C-T ; 3 pumps & 3 Inverters operation control
	UN3C-F ; 4 pumps & 4 Inverters operation control

 **Caution**	**Care must be taken not to exceed the range of the specification during use of this unit.**

4. INSTALLATION

4-1. Installation site

(1) Standard unit is outdoor design, can use in indoor area or outdoor area.
(2) Select a site where is well ventilated with little dust and low humidity.
Ambient temperature range should be 0~40°C and humidity should be below 85%.
(3) To prevent unauthorized access of personnel to this unit, take proper measures for safety for example, by providing a fence.
(4) Select a site suitable for maintenance and inspection of the unit.
Ensure there is at least 60cm around the unit to facilitate inspections.
(5) Select a site of installation such that water source is nearby, the suction head (height from suction water level to the center of pump) is small and the suction piping is short.

4-2. Piping

(1) The piping should be supported, because the unit cannot bear the weight of the suction and discharge pipe.
(2) In case of negative suction head, separate suction pipe is required for each due to prevention of air entry.
(3) A gate valve should be attached to the discharge side of unit for disassembly and inspection.

(4) ***In case of positive suction head (Inflow by gravity)***: **Fig. 1**

a) The suction piping should be as short as possible with minimum bends.

b) A strainer should be attached at the end of suction piping to prevent foreign matter from entering the unit, however pressure loss must be taken into consideration.

c) It is advisable to attach a stop valve to suction piping for disassembly and inspection.

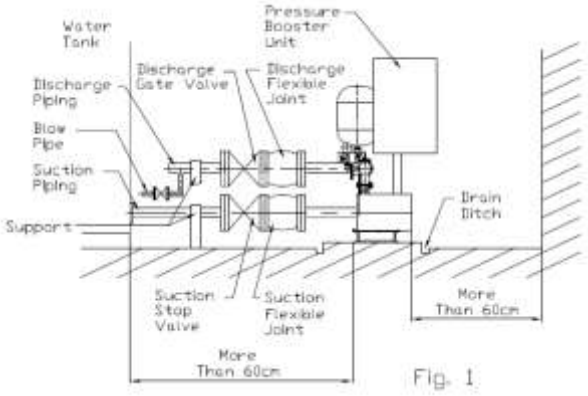


Fig. 1

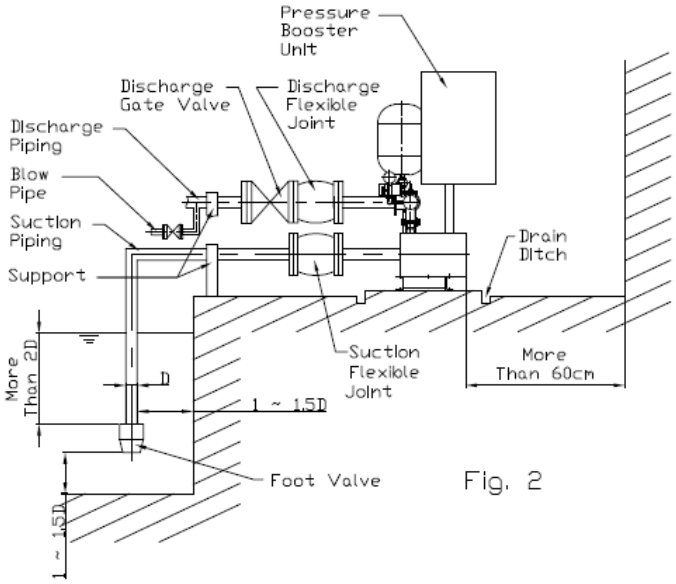


Fig. 2

(5) ***In case of negative suction head (Suction lifted)*: Fig. 2**

a) The end of suction piping should be more than twice the pipe diameter "D" below the water level, above the bottom and apart from the wall by a distance of 1~1.5 D.

b) Attach a foot valve with strainer at the end of suction piping to prevent foreign matter from entering the unit.

c) Suction piping should have an ascending slope (more than 1/100) towards the pump to avoid dead-air, and couplings are fixed tightly to prevent the intake of air.

Note: Don't use suction header and suction pipe should be set each pump.

(6) It is advisable to attach a blow pipe to the discharge side for inspection.

(7) It is advisable to attach a flexible pipe to the discharge and suction pipe for insulation of vibration.

4-3. Electric wiring

 **Warning**	**Unlicensed person is not allowed to carry out wiring and grounding.**
	Wiring and grounding are done completely according to the laws and the regulations.
 **Caution**	**Insulation and / or dielectric test for terminal of sensors in the control panel is not allowed.**

(1) In this unit, though the electric wiring of main component parts such as the motor, pressure sensor, controller etc. have already been done, the primary power source is not wired yet.
It must be done according to the circuit diagram in the control panel or approved drawings.
The installation of power source and wiring of controller must be carried out correctly according to the technical standard or the regulations for wiring.
Licensed person carries out even part of the wiring and grounding. If it is done by an unlicensed person, it is a violation of the law and is also extremely dangerous.

(2) Before turning on the operation switch, perform the following tasks:
   a) Check correct capacity of power fuse or breaker is used.
   b) Check wiring connection.
   c) Check that the unit is properly grounded.
   d) Check motor and controller terminals for loose or no connection.
      If loose or no connection, overheating, burning or open-phase operation might result.
   e) Allowance of terminal voltage is within +10%/-6% of rated value which is shown on Ebara motor.
      Exceeding this range will cause problems.

(3) When unit is protected for water shortage of suction tank, 5 pole's electrodes are wired with control panel in accordance with schematic diagram.

5. OPERATION

 **Caution**	**More than 10 minutes running with valve shut-off is not allowed.**

(1) Electrical system check

a) Check that wiring is correct and terminal screws are not loosened.
b) Check that the power source is wired.

(2) Priming of pump

Warning	**Whenever handling for inspection, priming or repair of this unit, always disconnect the electric power first.**
Caution	**Pump is not run without full of water.**
	Motor, control panel and sensors are not splashed with water.

a) Check water level of suction storage tank.
b) All shut-off valves (at pressure tank & pump discharge) of unit are opened.
c) Carry out priming of the pump.
Operation without priming will cause problem.
In case of positive suction head, priming can be done by opening the suction and discharge valves allowing piping system full of water and water level reaches the discharge port.
In case of negative suction head, loosen and take out the air vent plug of pump/or unit and fill it with water completely inside. Screw and tighten the plug after which.

(3) Check that the pump rotates smoothly and without abnormal noise.

Warning	**Whenever handling for inspection, priming or repair of this unit, always disconnect the electric power first.**

Through end hole of motor fan cover, rotating condition can be confirmed by turning the motor shaft end manually with a screw driver.

(2) ***Checks pump start-stop operation and the direction of rotation.***

Caution	**Do not touch the rotating parts.**

Layout of the control panel and LCD touch panel are shown in **Fig. 3** & **Fig. 4**.

a) Switch power supply on and check that the power LED on the control panel light up.
b) Open the control panel door and turn on the circuit breaker (MCCB) and mini breaker in the control panel. Then, close the door and that the display turn on.
c) Touch **"Stop"** and check that pump operation stop.
d) Touch **"System condition"** to show all pumps on a display, show on **Fig.5**.
e) Touch on **"No.1 Pump icon"** and show on **Fig.6.**

f) Touch **"Test"** is selected (the Test green color).

g) Touch **"Run"** to start pump operation.

h) Adjusts a frequency of pump since 5 Hz, No.1 pump will start to run until adjusts frequency to maximum frequency (50Hz).

i) Check that pump is in working order and that the rotation direction is correct (clockwise when viewed from the motor end to pump side).

j) Touch **"Stop"** to stop pump operation.

k) Touch **"Display back"** to show all pump and can select which pump.

l) Touch **"No.2 Pump icon"** is selected and checks the operation in the same manner as step f) to k). Then, check the operation of No.3 or No.4 Pump and later in the same manner (if there are 3 pumps or 4 pumps). After the check is completed.

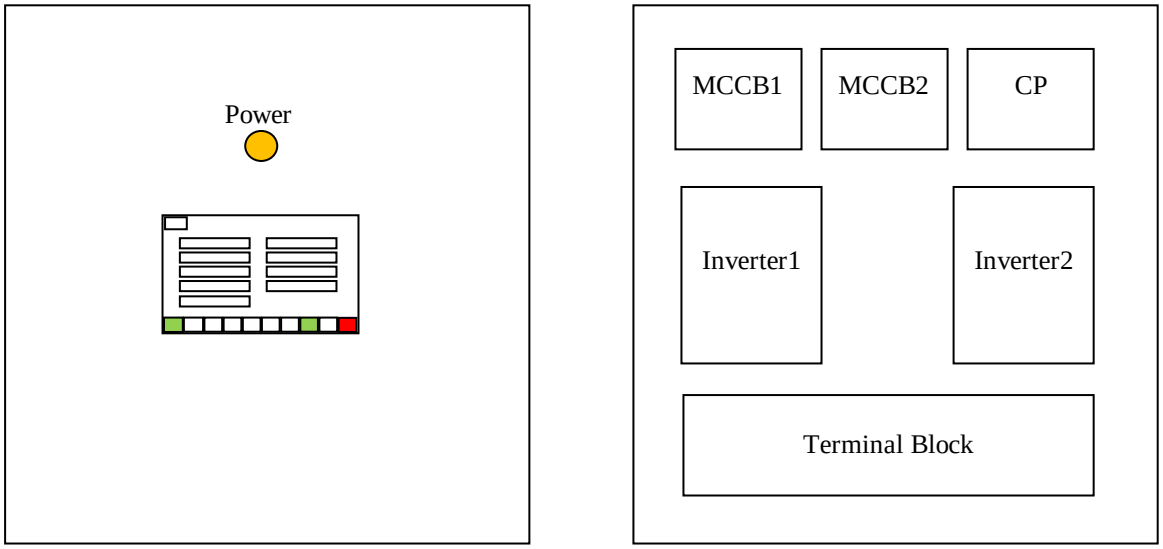


Fig.3

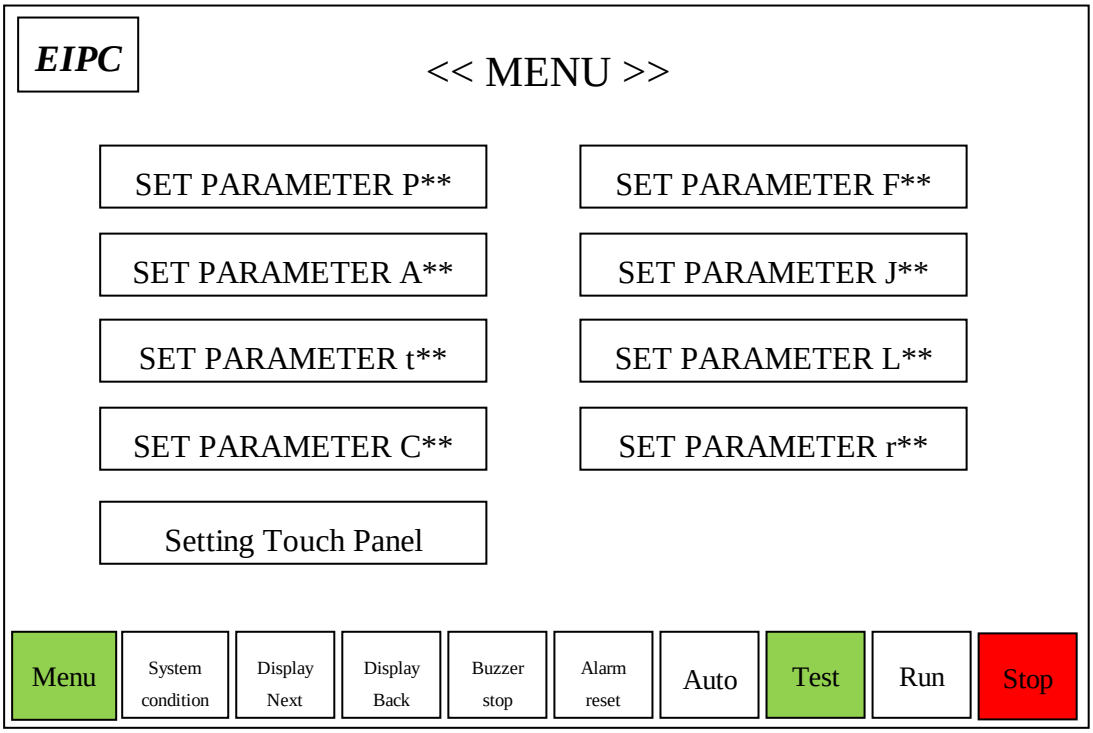

EIPC
<< MENU >>
SET PARAMETER P**
SET PARAMETER F**
SET PARAMETER A**
SET PARAMETER J**
SET PARAMETER t**
SET PARAMETER L**
SET PARAMETER C**
SET PARAMETER r**
Setting Touch Panel
Menu
System condition
Display Next
Display Back
Buzzer stop
Alarm reset
Auto
Test
Run
Stop

Fig.4

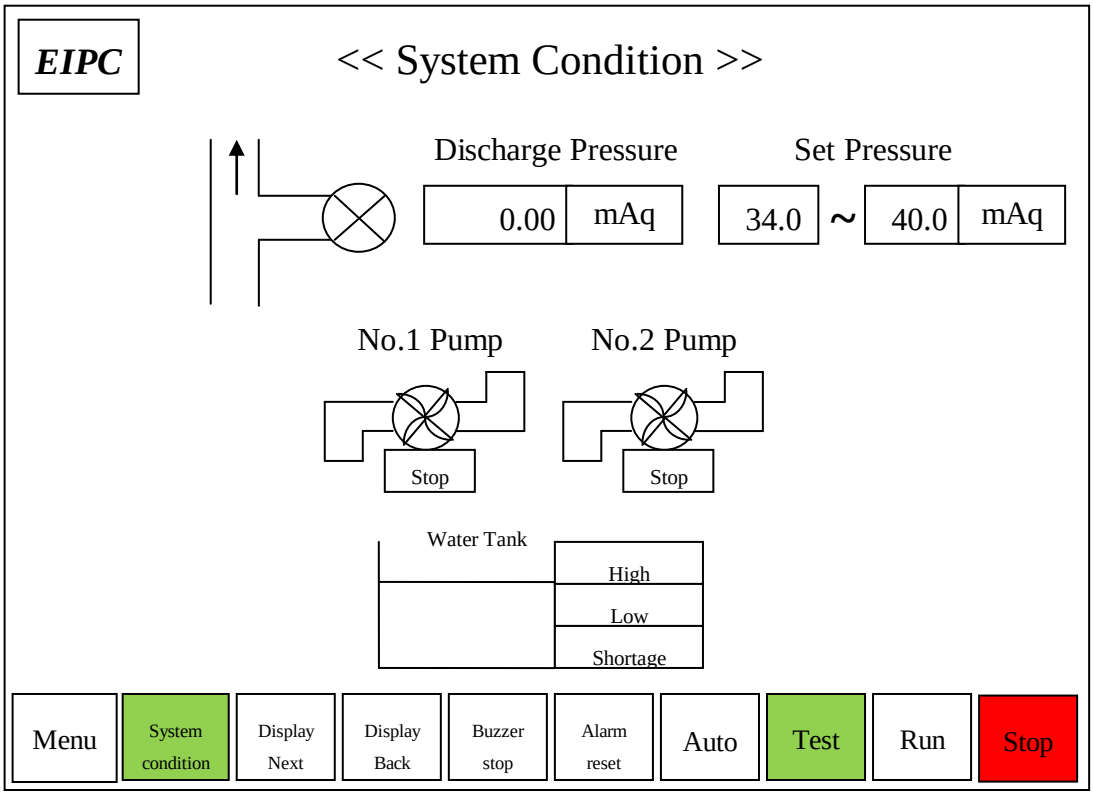

EIPC
<< System Condition >>
Discharge Pressure
Set Pressure
0.00
mAq
34.0
~
40.0
mAq
No.1 Pump
No.2 Pump
Stop
Stop
Water Tank
High
Low
Shortage
Menu
System condition
Display Next
Display Back
Buzzer stop
Alarm reset
Auto
Test
Run
Stop

Fig.5

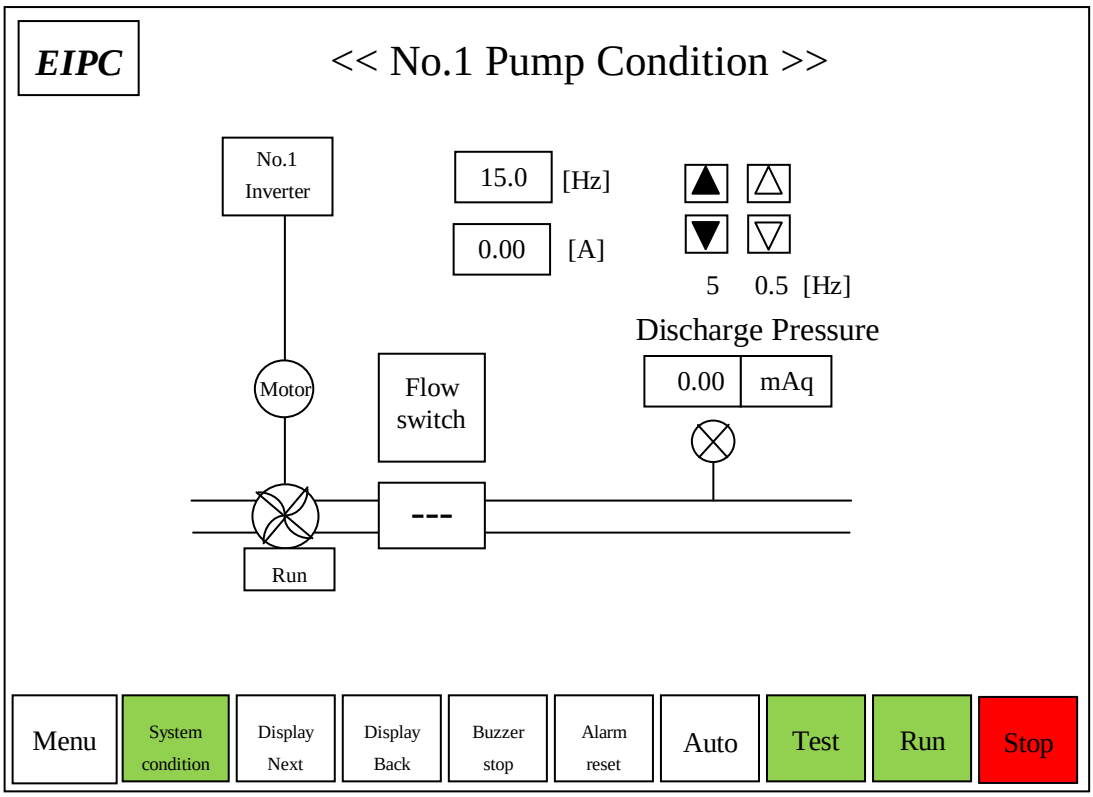


Fig.6

Besides that customers can look all pump real time monitor, all pump record (about running times and start counts) and alarm lists of each pump by touching "**Display next"**, show on Fig.7-9.

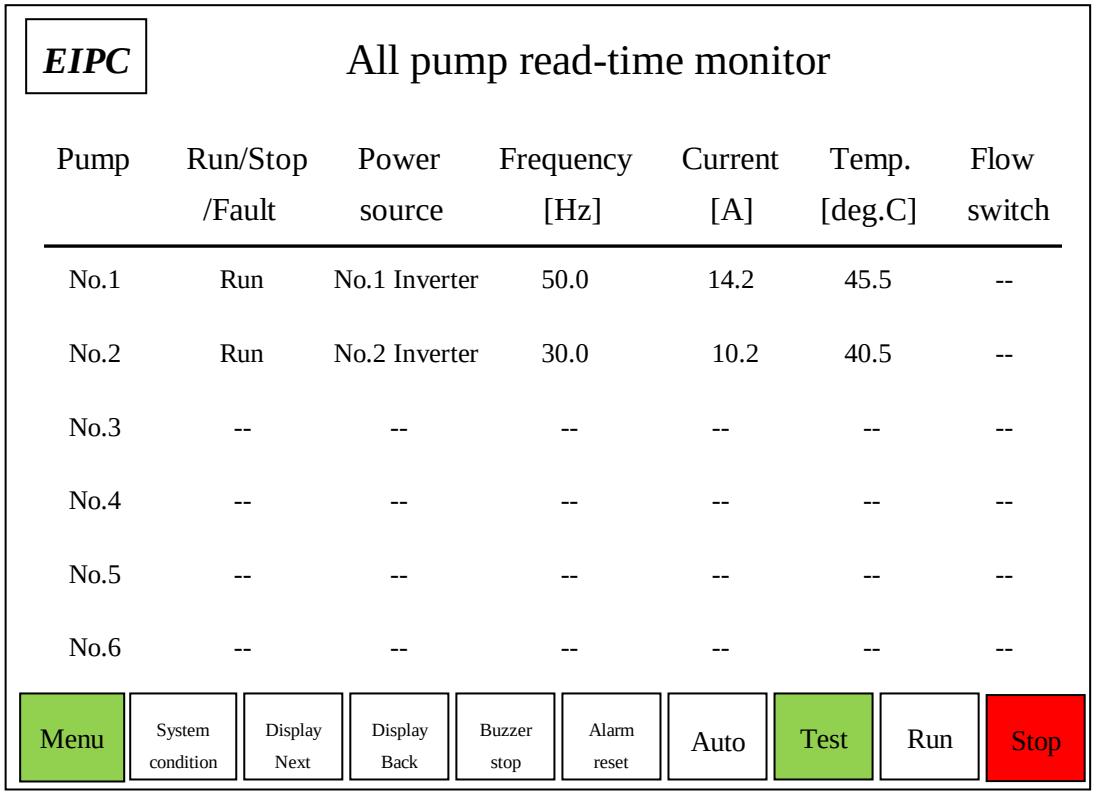


Fig.7

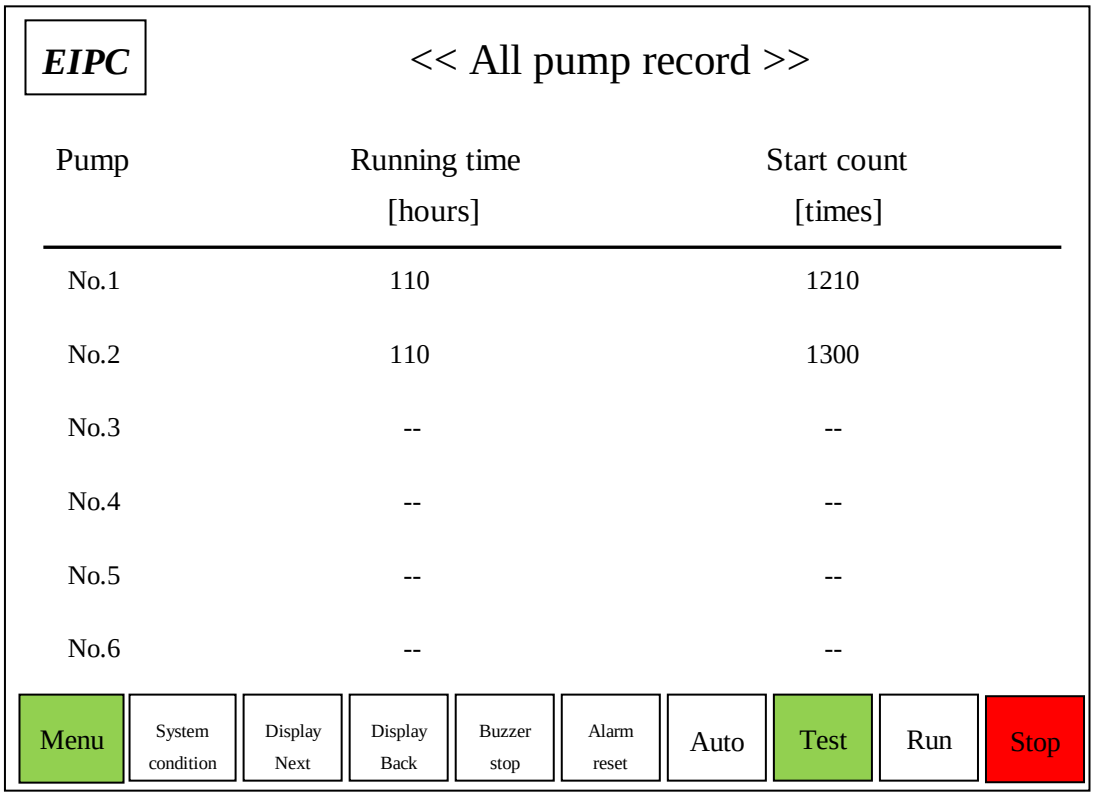

EIPC
<< All pump record >>
Pump
Running time [hours]
Start count [times]
No.1 110 1210
No.2 110 1300
No.3 -- --
No.4 -- --
No.5 -- --
No.6 -- --
Menu
System condition
Display Next
Display Back
Buzzer stop
Alarm reset
Auto
Test
Run
Stop

Fig.8

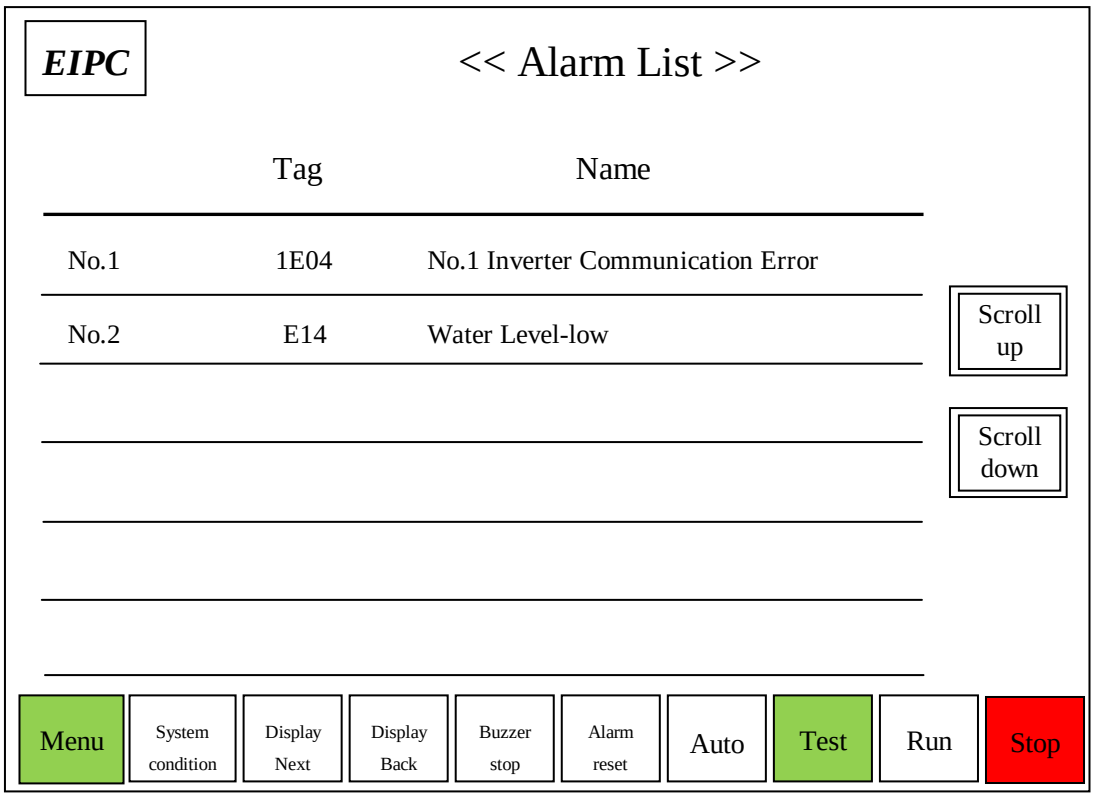
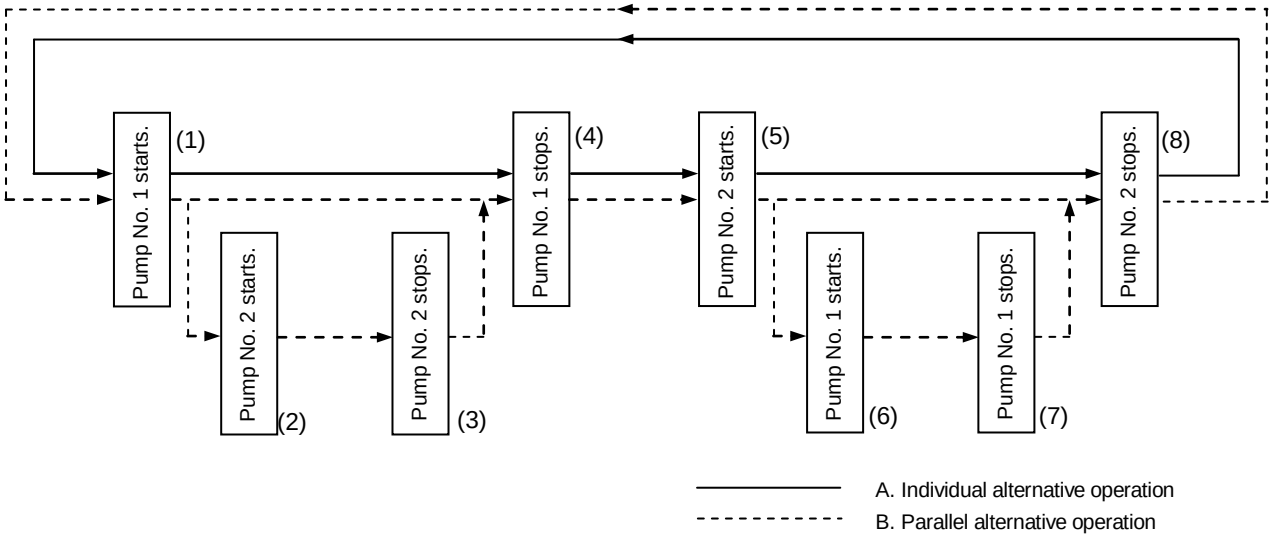

EIPC
<< Alarm List >>
Tag
Name
No.1 1E04 No.1 Inverter Communication Error
No.2 E14 Water Level-low
Scroll up
Scroll down
Menu
System condition
Display Next
Display Back
Buzzer stop
Alarm reset
Auto
Test
Run
Stop

Fig.9

(5) Check the automatic operation.

a) Touch a display at "**Auto"**.

b) Touch a display at **"Run"**, after that there are 2 operation.



A. Individual alternative operation

(1) Water consumption decreases the pressure in the piping system and trips the pressure sensor. Pump No. 1 starts.

(4) When the water consumption stops, Pump No.1 stops after a predetermined time has elapsed.

(5) Again, water consumption decreases the pressure in the piping system and trips the pressure sensor. Pump No. 2 starts.

(8) When the water consumption stops, Pump No.2 stops after a predetermined time has elapsed.

The above steps (1) => (4) => (5) => (8) are repeated.

B. Parallel alternative operation

(1) Water consumption decreases the pressure in the piping system and trips the pressure sensor. Pump No. 1 starts.

(2) When the water consumption increases, and the maximum pump speed of Pump No. 1 is reached, Pump No. 2 starts.

(3) When the water consumption decreases, Pump No. 2 stops. Only Pump No. 1 continues running.

(4) When the water consumption stops, Pump No. 1 stops after a predetermined time has elapsed.

(5) Again, water consumption decreases the pressure in the piping system and trips the pressure sensor. Pump No. 2 starts.

(6) When the water consumption increases, and the maximum pump speed of Pump No. 2 is reached, Pump No. 1 starts.

(7) When the water consumption decreases, Pump No. 1 stops. Only Pump No. 2 continues running.

(8) When the water consumption stops, Pump No. 2 stops after a predetermined time has elapsed.

The above steps (1) => (2) => (3) => (4) => (5) => (6) => (7) => (8) are repeated.

Pump operation stops when the water flow is continuously low for a certain period of time with the faucet closed.

(6) Error alarm.

When a trouble is occurred, buzzer sounds and error message is indicated.

Pump continues run or stop depend on alarm condition.

While the buzzer is beeping due to an alarm, press "Buzzer stop" to stop the buzzer.

While an alarm is generated, press "Reset alarm" to reset the alarm.

If an alarm is reset without removing the cause of the alarm, the alarm will be reset once but be generated again afterwards.

① Water level alarm.

Abnormal condition	Pump action	External output	Reset condition
High	Available running	available	Normal water level
Low	Available running	available	
Shortage	Not running	available	

② Failure alarm.

Alarm type	Displayed code	Cause	Measure
No.1 Pump air lock	1E03	- Pump air lock has caused by insufficient of priming water or air venting. - Foreign matter is caught in the suction piping side, the flow path is in the closed state. Therefore, pump water supply amount is not sufficient even if operating at rate speed. The discharge pressure does not reach the target pressure, and pump current is lower than the rated value.	- Do air vent and priming of the pump. - After the above operation, touch the alarm reset button.
No.2 Pump air lock	2E03		
No.3 Pump air lock	3E03		
No.4 Pump air lock	4E03		
No.5 Pump air lock	5E03		
No.6 Pump air lock	6E03		

Alarm type	Displayed code	Cause	Measure
Thermistor abnormal*	□E05	- Wiring of the thermistor (temperature sensor of pump casing) is disconnection or loose connection. - Wiring of the thermistor (temperature sensor of pump casing) is short-circuiting. Therefore, signal of the thermistor output is abnormal.	- Check the wiring of thermistor output. - Re-insert the connector. - Replace the thermistor.
No.1 Flow sensor abnormal*	1E06	- The flow switch signal logic of EIPC setting parameter is wrong. - Wiring of the flow switch is disconnection or loose connection. - Wiring of the flow switch is short-circuiting. - Foreign matter is caught in the flow path of the flow switch. - The flow switch is broken. Therefore, the flow switch is open even though pump operation is stop or pump driven by inverter is operating at rated speed. Inconsistency of the pump operation and the flow switch are generated as described above	- Set EIPC setting parameter A41 (flow quantity sensor) correctly. - Check the wiring of flow switch signal. Re-insert the connector. - Check the flow path of flow switch. - Replace the flow switch. - After the above operation, touch the alarm reset button.
No.2 Flow sensor abnormal*	2E06		
No.3 Flow sensor abnormal*	3E06		
No.4 Flow sensor abnormal*	4E06		
No.5 Flow sensor abnormal*	5E06		
No.6 Flow sensor abnormal*	6E06		
No.1 inverter communication error	1E07	- Inverter model setting of EIPC setting parameter is wrong. - The power of inverter is off. - Communication setting of the inverter setting parameter is wrong. - The inverter is broken. - Communication wiring is disconnection or loose connection. - Communication wiring is wrong. Therefore, there is no response of communication from inverter to EIPC.	- Set EIPC setting parameter C00 (inverter model) correctly. - Check the power of inverter. - Adjust communication setting of inverter setting parameter to EIPC. - Set communication ID to match inverter number correctly. - Replace the inverter. - Check the communication wiring connector, and terminal. - Replace the communication wiring. - Connect communication wiring correctly.
No.2 inverter communication error	2E07		
No.3 inverter communication error	3E07		
No.4 inverter communication error	4E07		
No.5 inverter communication error	5E07		
No.6 inverter communication error	6E07		

* In the standard booster unit UN3C, it is not available.

Alarm type	Displayed code	Cause	Measure
EEPROM on main board access error	E10	- It was not able to record the data in memory.	- Replace Main board(FR MN-1)
The sensor of discharge pressure is abnormal	E11	- Type setting of the discharge pressure sensor (Voltage output type or current output type) is wrong. - Signal wiring of the discharge pressure sensor is disconnection or loose connection. - Signal wiring of the discharge pressure sensor is short-circuiting. - Signal wiring of the discharge pressure sensor is wrong. - The discharge pressure sensor is broken. Therefore, the discharge pressure sensor signal is abnormal.	- Set No.8 switch of DIPSW (S4) on the main board correctly. - Check the signal wiring and terminal. - Connect communication wiring correctly. - Replace the discharge pressure sensor.
Water level-high	E13	- Water level-high of the water tank is detected.	- If water level-high of the water tank is resolved, this alarm is removed.
Water level-low	E14	- Water level-low of the water tank is detected.	- If water level-low of the water tank is resolved, this alarm is removed.
Water shortage	E15	- Water shortage of the water tank is detected.	- If water shortage of the water tank is resolved, this alarm is removed.
The electrode-type level switch is abnormal	E16	- Water level-high and low are detected at the same time. - Water level-high and shortage are detected at the same time.	- Check the water level sensor (electrode-type or float switch). Example: electrode corrosion, Poor mounting, entangled float switch. - Check the signal wiring and the terminal. - Connect communication wiring correctly.
Start counts of pump is so many	E17	- Stop pressure of EIPC setting parameter is wrong. - Tank pressure (accumulator) is decreased. Therefore, restart counts of pump from the stop at low flow rate is increased. It is detected in the case of a multi-frequency in three consecutive days.	- Set EIPC setting parameter P03 (Stop pressure) correctly. - Adjust the tank pressure (accumulator). - If the tank (accumulator) has deteriorated, replace it.
Pressure of the accumulator is short	E18	- Tank pressure (accumulator) is decreased. Therefore, discharge pressure immediately after the stop at low flow rate is decreased extremely.	- Adjust the tank pressure (accumulator). - If the tank (accumulator) has deteriorated, replace it.

Alarm type	Displayed code	Cause	Measure
Data array of pump shut-off pressure is abnormal	E19	- When the No.1 pump shut-off pressure was sampled, discharge partition valve was not closed. - When the No.1 pump shut-off pressure was sampled, test valve was not closed. - When the No.1 pump shut-off pressure was sampled, discharge side pressure was not released. - When the No.1 pump shut-off pressure was sampled, tank (accumulator) valve was not closed. - Sampling the No.1 pump shut-off pressure was interrupted. Therefore, inconsistency was detected at the matching data of the sampling end.	- Before sampling the No.1 pump shut-off pressure, close the discharge side valve. - Before sampling the No.1 pump shut-off pressure, released the discharge side pressure. - Before sampling the No.1 pump shut-off pressure, close the tank (accumulator) valve. - Wait unit sampling the No.1 pump shut-off pressure is finished.
System interlocking	E20	- System interlock (IL) signal is OFF.	- If system interlock (IL) signal is ON. This alarm is removed.
No.1 Each pump interlocking	1E20	- EIPC setting parameter [P31] = 1.	- Set EIPC setting parameter [P31] = 0.
No.2 Each pump interlocking	2E20	- EIPC setting parameter [P32] = 1.	- Set EIPC setting parameter [P32] = 0.
No.3 Each pump interlocking	3E20	- EIPC setting parameter [P33] = 1.	- Set EIPC setting parameter [P33] = 0.
No.4 Each pump interlocking	4E20	- EIPC setting parameter [P34] = 1.	- Set EIPC setting parameter [P34] = 0.
No.5 Each pump interlocking	5E20	- EIPC setting parameter [P35] = 1.	- Set EIPC setting parameter [P35] = 0.
No.6 Each pump interlocking	6E20	- EIPC setting parameter [P36] = 1.	- Set EIPC setting parameter [P36] = 0.
Priming tank level-high*	E22	- Water level-high of priming tank is detected.	- If water level-high of priming tank is resolved, this alarm is removed.
Priming tank level-low*	E23	- Water level-low of priming tank is detected.	- If water level-low of priming tank is resolved, this alarm is removed.
Elevated tank level-high*	E24	- Water level-high of elevated tank is detected.	- If water level-high of elevated tank is resolved, this alarm is removed.

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Alarm type	Displayed code	Cause	Measure
Elevated tank level-low*	E25	- Water level-low of elevated tank is detected.	- If water level-low of elevated tank is resolved, this alarm is removed.
No.1 Pump thermal trip*	1E27	- The pump is operated in overload condition. Therefore, the thermal relay is tripped.	- After remove the cause of overload, reset the thermal relay.
No.2 Pump thermal trip*	2E27		
No.3 Pump thermal trip*	3E27		
No.4 Pump thermal trip*	4E27		
No.5 Pump thermal trip*	5E27		
No.6 Pump thermal trip*	6E27		
Display board communication error	E29	- Power of the display board is off. - Display board is broken. - Communication wiring is disconnection or loose connection. - Communication wiring is wrong. Therefore, there is no response of communication from display board to EIPC.	- Check the power of display board. - Replace the display board. - Check the communication wiring connector, and terminal. - Replace the communication wiring. - Connect communication wiring correctly.
No.1 Each inverter interlocking	1E61	- EIPC setting parameter [J21] = 1.	- Set EIPC setting parameter [J21] = 0.
No.2 Each inverter interlocking	2E61	- EIPC setting parameter [J22] = 1.	- Set EIPC setting parameter [J22] = 0.
No.3 Each inverter interlocking	3E61	- EIPC setting parameter [J23] = 1.	- Set EIPC setting parameter [J23] = 0.
No.4 Each inverter interlocking	4E61	- EIPC setting parameter [J24] = 1.	- Set EIPC setting parameter [J24] = 0.
No.5 Each inverter interlocking	5E61	- EIPC setting parameter [J25] = 1.	- Set EIPC setting parameter [J25] = 0.
No.6 Each inverter interlocking	6E61	- EIPC setting parameter [J26] = 1.	- Set EIPC setting parameter [J26] = 0.

* In the standard booster unit UN3C, it is not available.

<table>
<tr><th>Alarm type</th><th>Displayed code</th><th>Cause</th><th>Measure</th></tr>
<tr><td>Option2-board1 communication error</td><td>E62</td><td rowspan="3">- Power of OP-2 board is off.
- OP-2 board is broken.
- Communication wiring is disconnection or loose connection.
- Communication wiring is wrong. Therefore, there is no response of communication from OP- board to EIPC.</td><td rowspan="3">- Check the power of OP-2 board.
- Set communication ID to match OP-2 board number by using DIPSW (DSW1) on the OP-2 board.
<table><tr><td rowspan="2">DIP.SW</td><td></td><td colspan="3">Communication ID</td></tr><tr><td></td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td>1</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td></td><td>2</td><td>OFF</td><td>OFF</td><td>ON</td></tr><tr><td></td><td>3</td><td>OFF</td><td>OFF</td><td>OFF</td></tr><tr><td></td><td>4</td><td>OFF</td><td>OFF</td><td>OFF</td></tr></table>- Replace the OP-2 board.
- Check the communication wiring, connector, and terminal.
- Connect communication wiring correctly</td></tr>
<tr><td>Option2-board2 communication error</td><td>E63</td></tr>
<tr><td>Option2-board3 communication error</td><td>E64</td></tr>
<tr><td>No.1 pump No.1 inverter trip</td><td>1E71</td><td rowspan="14">- System inverter signal is ON.</td><td rowspan="14">- Remove the cause with reference to alarm history of inverter.
- After the above operation, touch the alarm reset button.</td></tr>
<tr><td>No.2 pump No.1 inverter trip</td><td>2E71</td></tr>
<tr><td>No.3 pump No.1 inverter trip</td><td>3E71</td></tr>
<tr><td>No.4 pump No.1 inverter trip</td><td>4E71</td></tr>
<tr><td>No.5 pump No.1 inverter trip</td><td>5E71</td></tr>
<tr><td>No.6 pump No.1 inverter trip</td><td>6E71</td></tr>
<tr><td>No.1 pump No.2 inverter trip</td><td>1E72</td></tr>
<tr><td>No.2 pump No.2 inverter trip</td><td>2E72</td></tr>
<tr><td>No.3 pump No.2 inverter trip</td><td>3E72</td></tr>
<tr><td>No.4 pump No.2 inverter trip</td><td>4E72</td></tr>
<tr><td>No.5 pump No.2 inverter trip</td><td>5E72</td></tr>
<tr><td>No.6 pump No.2 inverter trip</td><td>6E72</td></tr>
<tr><td>No.3 pump No.3 inverter trip</td><td>3E73</td></tr>
</table>

Alarm type	Displayed code	Cause	Measure
No.4 pump No.4 inverter trip	4E74	- System inverter signal is ON.	- Remove the cause with reference to alarm history of inverter. - After the above operation, touch the alarm reset button.
No.5 pump No.5 inverter trip	5E75		
No.6 pump No.6 inverter trip	6E76		
No.1 ELCB trip*	E81	- Insulation the deterioration of ELCB secondary side circuit or electric instrument occurs and electric leakage is happened. Therefore, ELCB is tripped.	- Remove the cause. Then, turn off the ELCB and turn on it.
No.2 ELCB trip*	E82		
No.3 ELCB trip*	E83		
No.4 ELCB trip*	E84		
No.5 ELCB trip*	E85		
No.6 ELCB trip*	E86		
No.7 ELCB trip*	E87		
No.8 ELCB trip*	E88		

The symbol □ represents the pump No.

* In the standard booster unit UN3C, it is not available.

6. ADJUSTMENT OF PRESSURE SET VALUE

Before delivery from factory, set values have been suitably adjusted.

When re-adjusting is necessary, it should be done according to the following procedure, however it is advisable to request Ebara or our agent to carry out this adjustment for the prevention of any harmful effect.

(1) How to adjust supply pressure.

a) Touch at **"MENU"** and selects **"Set Parameter P**"** show on **Fig.10.**

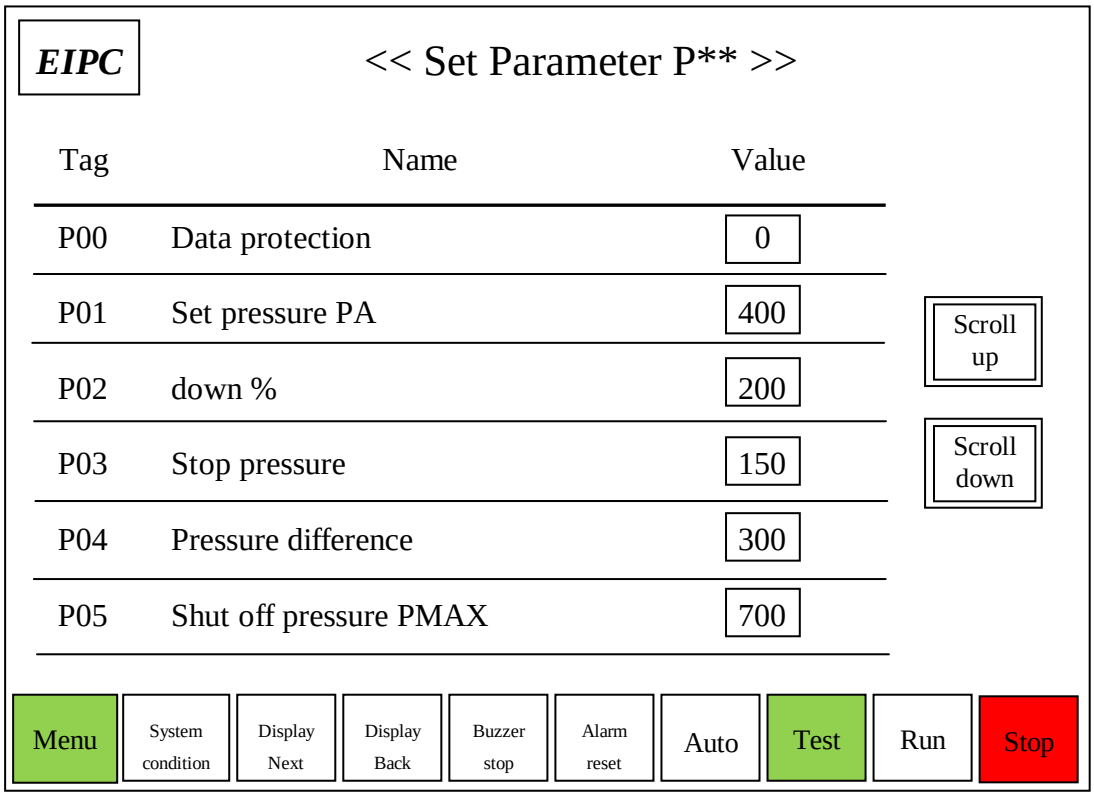

Fig.10

b) Change **P00** (data protection) from 1 to 0. And change **P01**(target pressure PA) ,such as 500(mean 50 mAq) to 400 (mean 40 mAq) and push **"ENT"**,show on **Fig.11** .

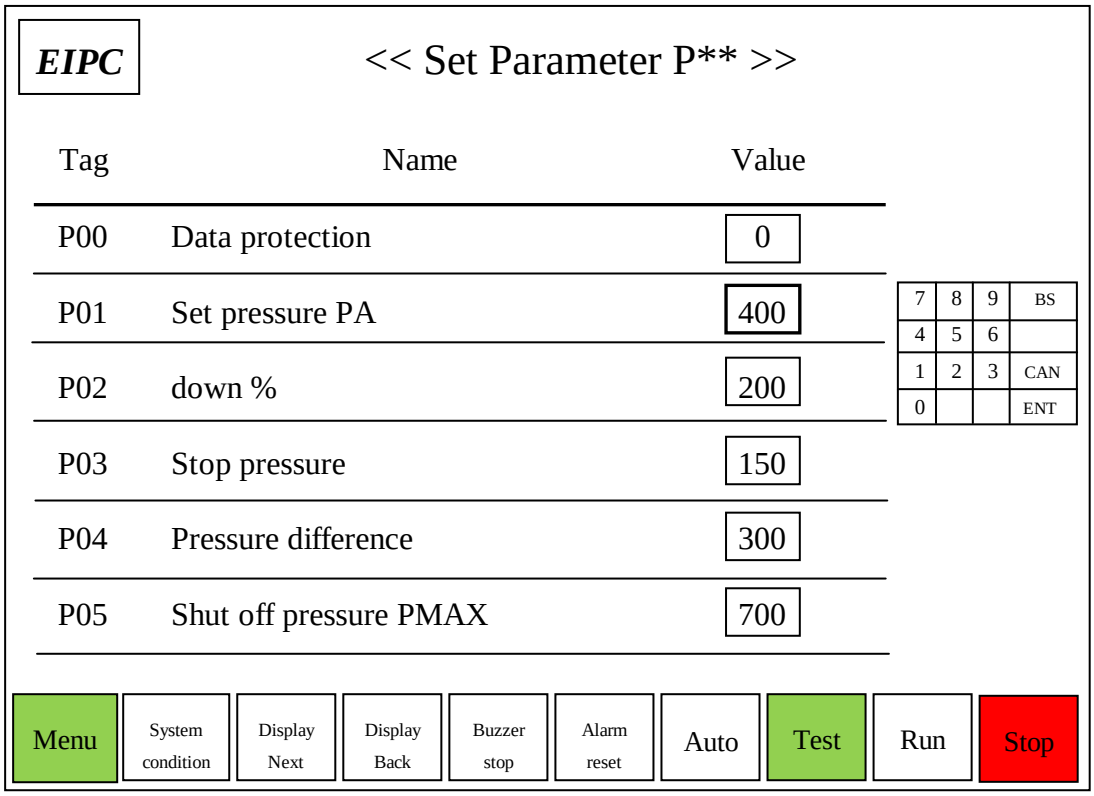

Fig.11

c) Change **P02**(down% mean piping loss) ,such as 15%(default value) from 40 mAq (piping loss 6 mAq) will show start pressure at 34 mAq when you finished to set pressure PA and down%.

d) Customer can set **P10** (water tank setting) that default setting is "1" , **P10** can be set to following condition.
0 : None
1 : One tank without a priming tank
4 – 8 : Two tanks without a priming tank
100 : With a priming tank
101 : One tank with a priming tank
104,105,107 : Two tanks with a priming tank
200 : External input signal for shortage
201 : External input signals for shortage and high

e) And then, customers can set **"Parameter A38"**(water tank low alarm) is following condition by touch **"MENU"** and selects **"Set Parameter A**"**.
1 : Enable (default setting)
0 : Disable [this alarm is also disabled by short-circuiting the electrode terminals with short-circuit wire.]

f) After that customer can set "A39" (delay timer for water tank low alarm output: minutes).
For the 5P electrode type, set the value to 1 (minute) (default setting).
For the 5P electrode type with the priming tank, set the value to 1 (minute).
When the water level falls to or below the threshold for the water tank low level, the alarm is issued after the set time has elapsed. If the delay time is too short, increase the setting value (up to 300 minutes).

Table 1 Default settings

Code	Setting					Default
▲▼	Name	Max.	Min.		Unit	
P00	Data protection	9	0	±1	-	0 (0: Data change permitted, 1: Data protected,2 to 9 : data don't be save)
P01	Set pressure PA	350.0	0.0	±0.1	m	0.0 *1
P02	down%	30	0	±1	%	15
P10	Water tank setting	201*2	0	±1	-	1
A38	Water tank low alarm	1	0	±1	-	1: Enable
A39	Delay timer for water tank low alarm output	300	0	±1	min.	1

*1. Enter the setting value according to the pump type.

*2. This value mentioned above from 6. Adjustment of pressure setting value (1) d.

(Determination of Supply pressure values)

Water supply pressure has to satisfy minimum pressure for water supply equipments.
The minimum pressure is shown in **Table 2**.
Suitable value should be determined referring to this, if existing value is not available.

Table 2 Minimum pressure value for water supply equipment

Water supply equipment	Minimum required water pressure (kgf/cm^2)
Flush valve	0.7
General faucet	0.3
Self-closing faucet	0.7
Shower	0.7
Instantaneous water-boiler	0.3

7. MAINTENANCE

Warning	**Unauthorized person is not allowed to disassemble, tamper or repair this unit.**
	Whenever handling for inspection, priming or repair of this unit, always disconnect the electric power first.
Caution	**Do not touch the rotating parts.**
	Whenever handling for inspection, priming or repair of this unit, always disconnect the electric power first.

Special attention should be paid to the following items during daily maintenance:

(1) When abnormal conditions occur with respect to discharge pressure, electric current, vibration or noise, immediate corrective action should be taken per **Chapter 8 "Trouble shooting"**.
Any such problems should be noted in the daily operation and maintenance report.

(2) Motor bearing is normal if the bearing housing can be touched with finger and there is no abnormal noise. Stop the operation and check the bearing if the housing is too hot to touch or with abnormal noise.

(3) The mechanical seal around the shaft usually does not allowed leakage. If leaking, it has to be replaced.

(4) Measure the air pressure in the tank by draining off the water in it and the discharge pipe
This inspection should be carried out once every 6 months.
If the pressure of the pressure tank is low, compressed air has to be charged to the specified pressure value as shown in **Fig.12.**

The specified pressure value is following at **table 3. the pre-charged air pressure of pressure tank.**

Table 3. Adjust the pre-charged air pressure of pressure tank as following.

No.	Unit model	kW	Hz	Pre-charge air pressure of pressure tank (kg/cm^2)	Remarks
1	UN3 CDX120/12	0.9	50	1.0	
2	UN3 CDX120/20	1.5		1.5	
3	UN3 CDX200/20	1.5		1.5	
4	UN3 CDX200/25	1.8		1.5	
5	UN3 2CDX120/15	1.1		2.0	
6	UN3 2CDX120/20	1.5		2.5	
7	UN3 2CDX120/30	2.2		3.0	
8	UN3 2CDX120/40	3.0		3.5	
9	UN3 2CDX200/30	2.2		2.5	
10	UN3 2CDX200/40	3.0		3.0	

No.	Unit model	kW	Hz	Pre-charge air pressure of pressure tank (kg/cm^2)	Remarks
11	UN3 2CDX200/50	3.7		3.5	
12	UN3 3M32-160/2.2	2.2		1.5	
13	UN3 3M32-200/3.0	3.0		2.0	
14	UN3 3M32-200/4.0	4.0		2.5	
15	UN3 3M32-200/5.5	5.5		3.0	
16	UN3 3M32-200/7.5	7.5		3.0	
17	UN3 3M40-160/3.0	3.0		1.0	
18	UN3 3M40-160/4.0	4.0		1.5	
19	UN3 3M40-200/5.5	5.5		2.0	
20	UN3 3M40-200/7.5	7.5		2.5	
21	UN3 3M40-200/11	11.0		3.5	
22	UN3 3M50-160/5.5	5.5		1.0	
23	UN3 3M50-160/7.5	7.5		1.5	
24	UN3 3M50-160/9.2	9.2		2.0	
25	UN3 3M50-160/11	11.0		2.5	
26	UN3 EVMS5 11N5/2.2	2.2		5.0	
27	UN3 EVMS5 15N5/3.0	3.0		6.5	
28	UN3 EVMS10 8N5/3.0	3.0	50	4.0	
29	UN3 EVMS10 11N5/4.0	4.0		5.5	
30	UN3 EVMS10 14N5/5.5	5.5		7.0	
31	UN3 EVMS15 6F5/5.5	5.5		4.5	
32	UN3 EVMS15 8F5/7.5	7.5		6.0	
33	UN3 EVMS20 6F5/7.5	7.5		5.0	
34	UN3 EVMS20 8F5/11	11		6.0	
35	UN3 EVMS20 9F5/11	11		7.0	
36	UN3 EVM32 4-1F5/7.5	7.5		4.5	
37	UN3 EVM32 5-0F5/11	11.0		5.5	
38	UN3 EVM32 6-2F5/11	11.0		6.0	
39	UN3 EVM45 3-0F5/11	11.0		3.5	
40	UN3 EVM45 4-0F5/15	15.0		5.0	
41	UN3 EVM45 5-0F5/18.5	18.5		6.0	
42	UN3 EVM64 3-2F5/15	15.0		3.5	
43	UN3 EVM64 4-2F5/18.5	18.5		5.0	
44	UN3 EVM64 4-0F5/22	22.0		5.0	
45	UN3 EVM64 5-0F5/30	30.0		6.5	

(5) Check internal conditions of the control panel for bad contacts and loose terminals and the presence of water droplets.

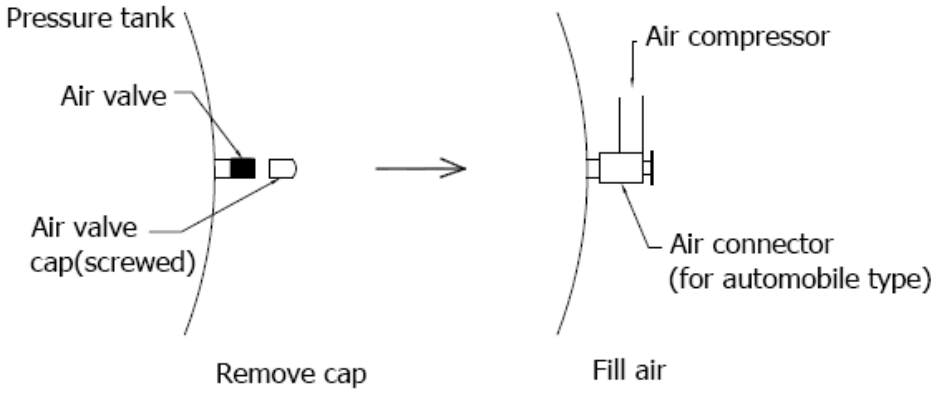

Fig. 12

(6) Check any water leakage or damage on the piping.

(7) Check the air outlet condition of control panel ventilation fan by hand. If outlet air is too hot or seems too less flow, check the air filters and make them cleaning.
It is advisable to check daily and make cleaning every 3 month.

(8) Re-adjustment of set value should be done when the following problems occur. The method should be referred to **Chapter 6 "Adjustment of Pressure Set Value"**.
a) Pump does not stop in automatic operation.
b) Supply pressure is too high or too low.

(9) When the unit is not operating for long period, water inside should be drained out and the electric power is disconnected.

(10) Consumable parts
Consumable parts of the unit are shown in **Table 4** below.
Replace when a symptom shown in the table appears.
Early replacement is recommended.

Table 4 Consumable parts of unit

Consumable parts	Symptom for replacement	Recommended replacement duration
Pressure sensor	Unstable supply pressure or operation	3-5 years
Pressure tank	Air pressure cannot be maintained	3-5 years
Pump mechanical seal	Water leakage	1-2 years
Air filter	Becomes dirty or clogged	2-3 years
Gasket, O ring	----	Whenever at disassembly
Pump ball bearing	Over heat or abnormal noise	3 years
Capacitor of inverter	Unstable operation	3-5 years
Ventilation fan	Unstable or abnormal operation	3-5 years
Control board	Unstable operation	3-5 years

8. Trouble Shooting

Trouble shooting of the unit is reference to **Table 5** below.

On trouble shooting of pump and motor, refer to the pump and motor instruction manuals.

Table 5. Trouble shooting

Symptom	Possible Causes	Counter Measures
Faucet opened & no water flow	1) Valve on feed-water pipe closed. 2) The power supply doesn't turn on. 3) Operation mode is not set to "**Auto"**. 4) The protection operation is performed. 5) The pump protection operation is performed. 6) Supply pressure setting too low. 7) Faulty pressure sensor. 8) Faulty connection. 9) Motor protection device activated. 10)The water tank level has reached the shortage level. 11)Faulty control panel. 12)Faulty motor connection. 13)Faulty pump/motor. 14)The voltage is out of the allowable range. 15)Reversed pump rotation. 16)Power supply open-phase. 17)Pumps don't primed.	1) Open valve. 2) Turn on the power. 3) Set the mode to "**Auto"**. 4) See the section of the protection operation. 5) Inspection & repair. 6) Increase setting supply pressure. 7) Inspection & repair or replace. 8) Repair 9) Inspection & repair or replace. 10)Increase water level. 11)Repair & replace. 12)Repair. 13)Repair. 14)Adjust power supply. 15)Correct wiring. 16)Remove the cause of the open-phase. 17)Prime pumps.
Pump develops a chattering noise (Pump frequently stops and starts)or unstable pump operation speed	1) Improper pressure setting. 2) Faulty pressure sensor. 3) Decreased volume of air in pressure tank. 4) Pulsating pressure due to faulty piping.	1) Correct pressure set value. 2) Inspection & repair or replace. 3) Charge air. 4) Correct piping

Symptom	Possible Causes	Counter Measures
Operation starts with no water consumption	1) Pipe leakage. 2) Check valve leakage. 3) Faulty pressure sensor. 4) Faulty control panel. 5) Improper pressure setting.	1) Repair. 2) Repair or replace. 3) Inspection & repair or replace. 4) Inspection & repair. 5) Correct the pressure set value.
Uneven water flow with faucet opened	1) The set pressure is too low. 2) Deterioration in pump performance. 3) Water feed valve is not fully opened. 4) Faulty pressure sensor. 5) Faulty inverter. 6) Faulty control panel. 7) The water consumption fluctuates.	1) Increase the pressure set value. 2) Repair (Refer to pump instruction manual). 3) Fully open the valve. 4) Inspection & repair or replace. 5) Inspection & repair. 6) Inspection & repair. 7) Moderate the change in the water consumption
Water from the faucet is interrupted.	1) The set pressure is too low. 2) Deterioration in pump performance. 3) Water feed valve is not fully. 4) The set pressure drop rate (down %) is too high. 5) The valve for connection to the pressure tank is not fully opened. 6) Insufficient capacity of the booster pump unit.	1) Increase the pressure set value. 2) Repair (Refer to pump instruction manual). 3) Fully open the valve. 4) Lower the set value. 5) Fully open the valve. 6) Review the plan for the booster pump unit.

Symptom	Possible Causes	Counter Measures
Power protective device activated (Pump overloaded)	1) Voltage too low. 2) Excess current flow. 3) Overload caused by entrapped foreign matter. 4) Motor trouble. 5) Faulty connection. 6) Excess current due to excessive opening of pump outlet valve. 7) Faulty control panel.	1) Adjust power supply. 2) After improvement, reset thermal protect device. 3) Remove foreign matter. 4) Repair or replace. 5) Repair 6) Adjust valve opening and reset overload of inverter. 7) Inspection & repair.
Pump does not stop when faucet is closed	1) The operation is not set to **"Auto"**. 2) Faulty pressure sensor. 3) Pressure sensor piping clogged with dirt, etc. 4) Deterioration in pump performance. 5) Reversed pump rotation. 6) Faulty control panel. 7) Water leakage from feed water pipe. 8) Faulty inverter. 9) The voltage is out of the allowable range.	1) Set the mode to "**Auto"**. 2) Inspection & repair or replace 3) Clean piping. 4) Repair (Refer to pump instruction manual). 5) Correct wiring. 6) Inspection & repair. 7) Repair. 8) Inspection & repair. 9) Adjust power supply.
Alternative operation is disabled.	1) The pump No. is not set to "**Auto"**. 2) Faulty control panel. 3) Pump stop control at low flow rates is disabled. 4) There is a pump interlocked by individual interlock setting.	1) Set the pump No. to "**Auto"**. 2) Inspection & repair. 3) Inspection & repair. 4) Set the setting codes P31 to P36 to 0: No. interlock.

Symptom	Possible Causes	Counter Measures
The inverter protection operation is performed.	1) Protection operation is performed to the stopped pump.	1) Reset after inspection/repair.
	2) The water flow rate is excessive.	2) Review the plan for the booster pump unit.
	3) The pressure set value is too low.	3) Increase the set value.
	4) Open-phase operation.	4) Remove the cause of the open-phase.
	5) Faulty motor.	5) Inspection & repair.
	6) Used in overload.	6) Review the plan for the booster pump unit.
	7) An instantaneous power failure occurred.	7) Remove the cause of the power failure.